

Deputy Under Secretary of Defense (Industrial Policy)
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Introduction

I am honored to have the opportunity to speak with you today and share my thoughts about the future of the defense industrial base. But let me pause for a moment to comment on the current health of the defense industrial base. I don't have to tell this audience that there are pockets of overcapacity in space programs, cyclical impacts on commercial aerospace programs, and instances of program challenges.

But the health of the overall defense industrial base is strong by any measure. The 700,000 aerospace industry employees worked hard to bring us the successes of Operations Enduring and Iraqi Freedom: tripling JDAM production, doubling PGM production at a third less unit cost, and surging countless critical warfare items without hesitation. Defense manufacturing employment is increasing, as large and small

companies add to their work forces in response to increasing procurement budgets and large program starts. In fact, 70% of last quarter's positive GDP growth was attributable to defense. After its low in the mid-1990s, defense is an increasing proportion of overall U.S. manufacturing. But, as I have often had occasion to remind our Congressional colleagues lately, we are still only 2.4% of overall industrial manufacturing—3.8% if we include commercial aerospace.

Operating margins are nearly double what they were in the 1980s, stock price performance outpaced the S&P500 19% to 15% in the 2nd quarter of 2003, and the P/E ratios at 22 to 1 are well above the historical averages of 9 to 1.

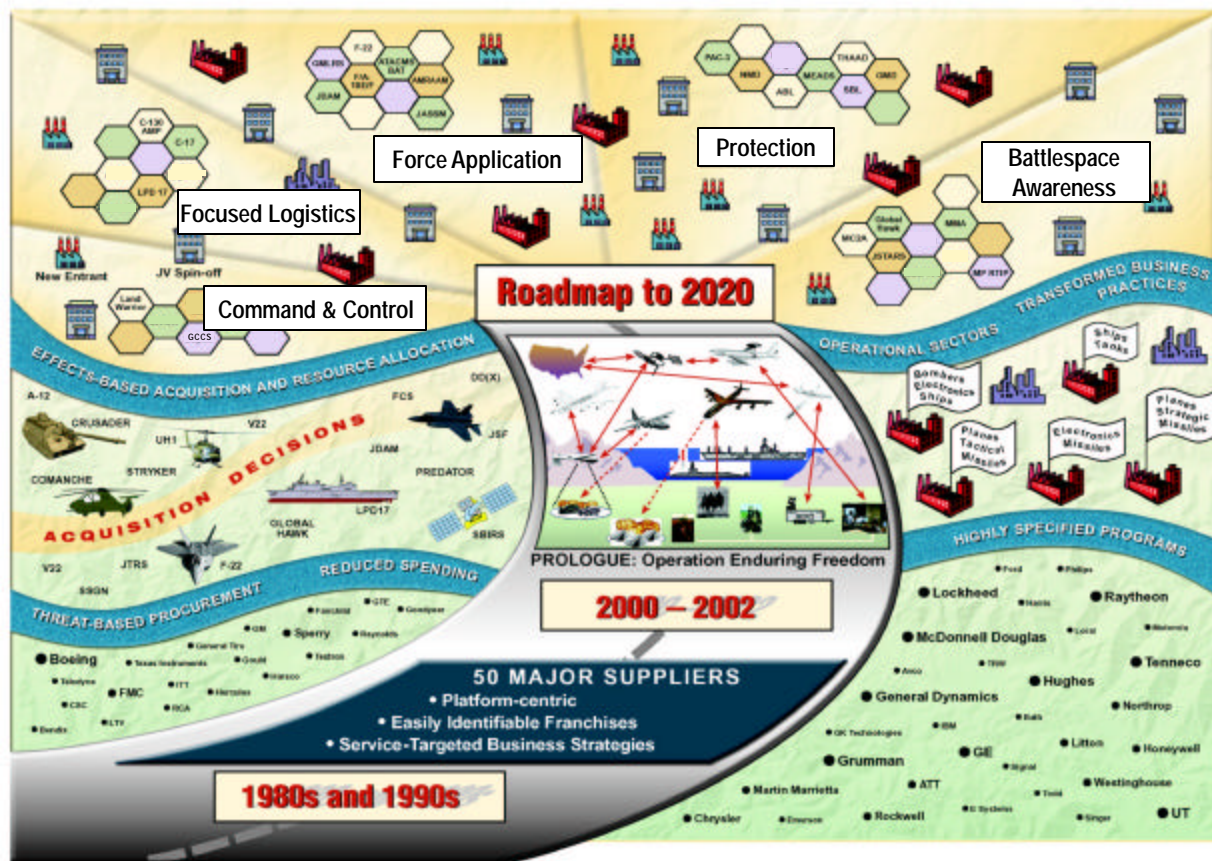
But we are not content to be complacent. We must help shape an industrial base that will supply 21st century warriors as effectively as it has prior generations of American men and women in uniform.

"Road Maps" have become the Department's term to describe our attempt to sketch paths to future end states. I often worry that the public confuses our road maps with the AAA variety where each turn is known for sure! Our roadmaps generally involve much more envisioning of where we must go if we are to succeed. So let me give you a brief tour of the defense industrial base landscape: where we have been and where we are going. I will then close with a more detailed discussion of what some of our recent "cartography" has shown us about the space industrial base.

The Defense Industrial Base Road Map

A version of the graphic that you see behind me was used in a report we published on transformation of the defense industrial base this February.

A Roadmap to the Future Defense Industrial Base



Source: Transforming the Defense Industrial Base: A Roadmap (<http://www.acq.osd.mil/ip>)

As the lower right sectors of the chart show, the defense industrial base of today is a distillate of its prior form. What were roughly 50 major defense suppliers in the 1980s have become five highly consolidated, cross-Service, cross-platform prime contractors. As such, they are uniquely suited to provide us with system-of-systems approaches to requirements.

The middle of the map shows the backdrop against which this Administration began making budgetary and weapons system acquisition decisions. This environment included three key features: a number of large programs still on the drawing board as long as 20 years after inception; this highly consolidated defense industrial base; and the realities of warfighting in the 21st century as punctuated by Operations Enduring and Iraqi Freedom. Recognizing that the futuristic weapons systems required for 2020 and beyond will not be forged overnight, the Department moved programs essential to next generation warfighting from development into production.

Over the first two years of this Administration, we also began realizing that the Secretary's transformation mandate required a different lens for viewing the defense enterprise: one that was organized around the most essential operational effects that the U.S. war fighter must be able to achieve to be successful. The top of our landscape shows the major Joint Warfighting Capabilities Architectures (JWCAs) recently articulated by the Joint Staff:

Battlespace Awareness, Command and Control, Force Application, Protection, and Focused Logistics. These five concepts are becoming the central theme for Department decision-making capturing operational concepts, requirements, system interfaces, and architectures in a single framework.

- *Battlespace Awareness is the ability of commanders and all force elements to understand the environment in which they operate and the adversaries they face. It uses a variety of surveillance capabilities to gather information, a harmonized net-centric environment to manage this information, and a collection of capabilities to analyze, understand and predict.*
- *Command and control is the exercise of authority and direction of a commander over forces to accomplish a mission. It involves planning, directing, coordinating, and controlling forces and operations. It provides the means for a commander to recognize what is needed and ensure that appropriate actions are taken.*

- *Force Application is the engagement of adversaries with lethal and non-lethal methods. It covers the entire spectrum of conflict.*
- *Protection defends forces and U.S. territory from harm. It includes missile defense and infrastructure protection and other capabilities to thwart force application by an adversary.*
- *Focused logistics deploys, redeploys, and sustains forces anywhere in the world for continuous operations.*

We believe that this changed vernacular will fundamentally change the defense enterprise over the next several years. How we look at what we have and need will also affect who participates in the defense industrial base.

After 9/11 at Ground Zero, for example, two of the first responders from the defense industry were from very different corporate entities. Raytheon's thermal imaging rescue systems were used by one group of first responders. Other robotic searchers used on site were made

by iRobot, a company recently better known for toys and robotic vacuum cleaners. Raytheon is a company of tens of thousands of employees and about \$17 billion in revenues; iRobot is a relatively nascent company of roughly one hundred employees and one-thousandth the revenues of Raytheon—and which has just won its way onto the Future Combat System program with its unmanned ground combat vehicles!

Real-Time Transformation

We envision three major sources of new and innovative companies that will be household names by 2020. First, we believe that most of the legacy defense suppliers have well understood the transformation mandate, and will change with the times. One of the ways that they could change is by acquiring emerging defense suppliers or by expanding their product offerings. Their corporate names may be the same in 2020, but likely their operating divisions will have different

names. They will be joined by lower-tier firms that grow to be prime contractors.

The second source of new companies in the corporate landscape of 2020 will be those companies – perhaps like iRobot, or those innovative, emerging defense suppliers now in joint ventures with primes – that achieve critical mass outside the direct corporate control of one of today’s primes. Perhaps the surfboard manufacturer Foam Matrix, who entered the defense market to make wings for Lockheed’s Joint Air-to-Surface Standoff Missile and now with Boeing produces the wings for the Air Force’s unmanned combat aerial vehicle, will find enough markets to become a prime composite structures manufacturer on its own.

And third, there will be commercial companies or divisions of companies that form around defense requirements. These could be the pharmaceutical companies that present themselves to the challenges of chemical biological warfare and associated

vaccination programs. Or they could be entertainment companies like Westinghouse in the mid-1930's, whose radio broadcasting skill the government thought may be applicable to the development of radar. Today's entertainment companies might, for example, apply their ability in visualization to the battlefield of tomorrow.

As the Department transforms from the threat-based days of the Cold War to the capabilities-based forces of today, the old must give way to the new. With today's constrained budgets and on-going War on Terrorism, we do not have the luxury to be inefficient. Capabilities-based analysis of gaps and overlaps must be the normal course of business. The ability to rapidly strike surface targets anywhere in the world may be satisfied by a submarine with cruise missiles, a B-2 with Joint Direct Attack Munitions, a Guided Long-Range Missile System battery, or a space-based weapon. We analyze these against the attributes important to the war fighter like precision and availability and make sure we have covered the capability without having redundancy.

Much like new thinking is required for war fighting, we must insist that our defense industrial base remain focused on 21st century challenges. From time to time, this will mean ceding the ordinary, widely available products to the global industrial base. For example, the first semiconductors were developed over forty years ago with research funding support from DoD. The first production order for integrated circuits was for the Minuteman Missile program circa 1959. In 1965, over two thirds of the devices made by the semiconductor industry were used in DoD weapon systems. Today, much less expensive integrated circuits are widely used in consumer, industrial, automotive, and communications products. In fact, by 2000, total government consumption (including DoD) fell below 0.5% - and semiconductors are now a global market commodity. Our access to this vibrant commercial product market for semiconductors serves us well, with few exceptions.

Titanium is another example where the U.S. government developed the material and dominated initial purchases, but currently has a significant but small portion of the market. Titanium was a laboratory curiosity until the 1930s and 1940s when a production process was invented by W.J. Kroll under U.S. Bureau of Mines funding. In 1948, DuPont started production in the world's first titanium sponge production facility, with the government taking almost all production – mostly for defense aerospace applications. Even in the 1980s, defense sectors consumed approximately three-quarters of titanium production. However, significant growth occurred in broad civil sectors such as sporting goods, chemical plants, and automobiles. By 2003, defense applications shrunk to approximately one-third of total titanium produced – a commodity successfully transitioned to the commercial marketplace.

It is the natural course of things that what was once new becomes old and that the old cede to the new.

Battlespace Awareness and Space Industry

To help understand and manage this process, my office published a report in February, titled Transformation of the Defense Industrial Base: A Roadmap. In the report we made three recommendations that you can see on the chart.

Transformation of the Defense Industrial Base: A Roadmap

<u>Recommendations</u>	<u>Status</u>
1 The Department should view the industrial base as being notionally composed of five operational effects-based sectors.	The Joint Staff has adopted five functional architectures defining operational effects-based sectors: "the new vernacular."
2 The Department should organize its decision-making processes to optimize operational effects not programs, platforms, or systems.	Update to CJCSI 3170.01 and DoD 5000 series introduce new requirements decision-making process and use of architectures in acquisition process.
3 DoD ought to analyze the results of a systematic assessment of critical technology requirements in each of these sectors.	ODUSD(IP) conducting Defense Industrial Base Capabilities Studies for each sector beginning with Battlespace Awareness. All initial studies complete in 2005.

The first recommendation said that we should view the industrial base from a capabilities or effects-based perspective. We suggested five notional sectors for this purpose. Soon after, the Joint Staff released its framework of five functional architectures.

The second recommendation was to use a capabilities-based approach for decision-making. It introduced the idea of acquisition decision-making on entire capabilities-based sectors rather than individual programs by themselves. The new CJCS Instruction 3170.01, Joint Capabilities Integration and Development System, implemented a capabilities-based process for analyzing gaps and overlaps and specifying requirements. The new 5000 series of acquisition regulations also prominently feature architectures.

To define some of the new thinking about the transformation of the defense industrial base, my office is busy implementing the third recommendation. Beginning with Battlespace Awareness, the Defense Industrial Base Capability Studies will assess the sufficiency of

the most critical segments of the industrial base in each JWCA sector. We are using a methodology for critical technology and industrial capability assessment derived from last year's Space R&D Industrial Base Study which my office sponsored along with the National Reconnaissance Office. This methodology categorizes war fighter capabilities according to the advantage they give the U.S. over its adversaries. We focus extra attention on those capabilities where we wish to lead the rest of the world and less attention where leadership is not possible or not particularly advantageous. Our attention then turns to the key technologies that enable the capabilities where we wish to lead. Our studies assess the most critical of those technologies for industrial base sufficiency. When an industrial base deficiency is identified, we look at the levers we have available to correct or avoid future deficiencies and make recommendations on the application of those levers. Funding innovation is the first of these levers. Optimizing acquisition strategies and program management structures is the second. The third lever is applying external corrective measures such as regulatory actions or developing new sources.

The Space R&D Industrial Base study identified several deficiencies in the space industrial base. Most of these are under active management to address the deficiency. For example, the space-qualified atomic clock segment is critical to the GPS program. That program office works to ensure adequate funding for innovation and acquisition strategies to support the health of that industry. In another example, the Department has recently placed a heavy investment in capital equipment for the production of the next two generations of radiation-hardened integrated circuits. While radiation-hardened parts are key components in nearly all of our satellite systems, there is little commercial demand for these parts. Our investment enables industry to make available space-qualified computer processors and memory chips orders of magnitude more capable than those sold today.

With the Defense Industrial Base Capabilities Studies, we are extending the insights we learned from the Space R&D Industrial Base

Study to the entire defense industrial base by JWCA sector.

Completing the initial look at each sector, however, is just the beginning. We intend to proactively assess critical technologies and continuously improve our understanding of those industrial capabilities. Furthermore, this capabilities-based framework helps us to appropriately understand and address industrial base deficiencies whether they supply a critical technology or not.

It is also hoped that these five studies which we hope to be able to complete by the end of 2005 will help companies large and small – and indeed the whole of our defense industrial enterprise – have more direct insight about the critical industrial base capabilities required by the 21st century warfighter.

Conclusion

We will also count on all of you in this room and your peers to continue to help stimulate the great intellectual capital of this nation

to our cause. And we must never lose sight of the fact that the defense industrial base is so much more than our manufacturing lines.

When eight- to twelve-year olds begin to think that math and science are cool, it is our responsibility to make sure they understand that some of the highest frontiers and noblest causes involving math and science are in our industry. When an inventor or budding engineers think that they have happened upon something with application to defense, the defense enterprise should have easy on ramps. And when emerging defense suppliers knock on our doors, we should not erect barriers.

What our office will be learning about space in or Battlespace Awareness and Command and Control industrial base assessments over the next year will lead the way to a different way of viewing the defense industrial base. So, space has once again led the way into a new frontier. Transformation of the industrial base and a focus on war fighter capabilities will lead to better systems and effective systems of

systems across the entire defense enterprise. We look forward to your continued contributions in the space industry and elsewhere keeping America ahead of its adversaries.

Thank you.